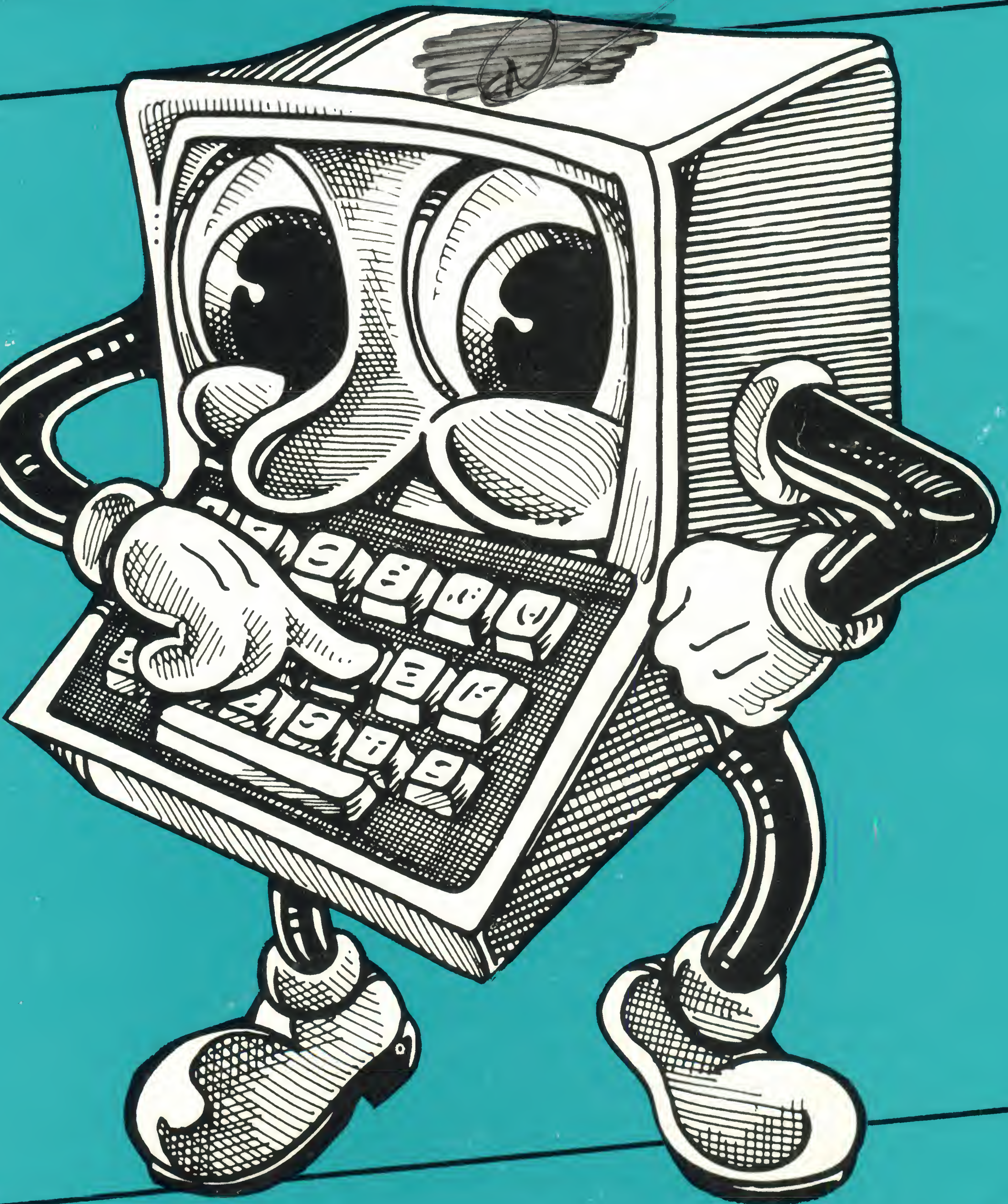
A Self-Teaching Guide to BASIC


[redacted]

Richard O. Kratzer

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EX: BACTERIA DOUBLE EVERY 30 MINS. STARTING w/1 BACTERIUM HOW MANY IN 24 HOURS? 47 DOUBLINGS

PRINT 2 ∧ 47 RETURN

ans: 1.40737488 E + 14

SC. NOTATION E + 14 = 10^{14}

∴ 1.40737488 × 10^{14}

(ans.: 140,737,488,355,328)

CONTROL RESET (NO ⏻)

TO SET COMPUTER UP TO DO BASIC

CONTROL C

BREAK.

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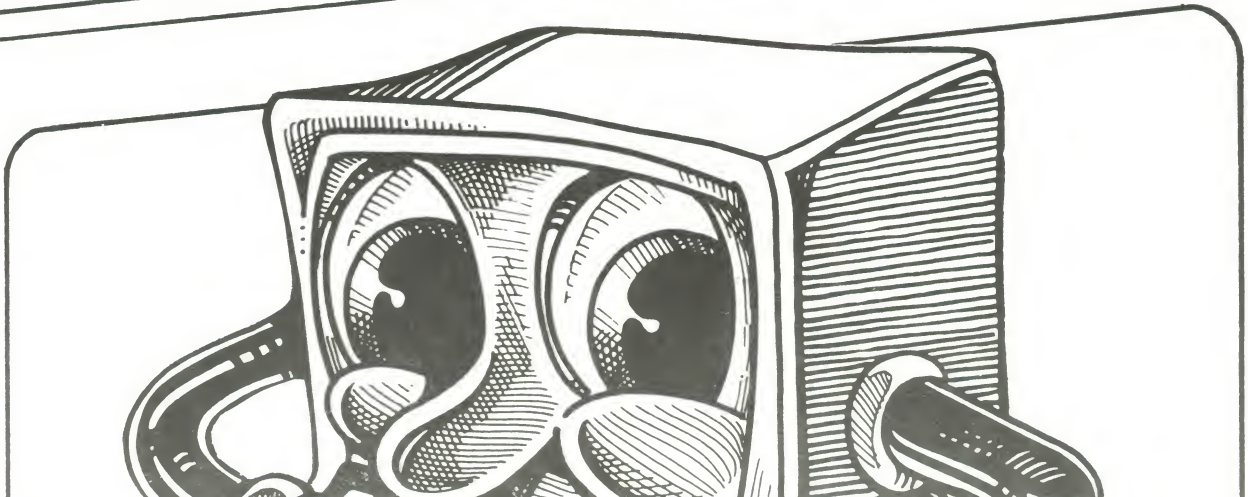

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Systems Disk

TO THE TEACHER

A Self-Teaching Guide to BASIC presents a hands-on, guided-discovery approach for beginners to learn BASIC. The lessons teach skills sequentially—that is, later lessons develop the concepts and techniques introduced in previous lessons—so, in most cases, students should perform them in order. Since the commands and statements presented in each lesson or group of lessons is clearly indicated, you may also assign lessons out of order to students having difficulty with a particular topic. You will achieve the best results if you try the lessons yourself before you assign them. This will prepare you to anticipate problems as well as suggest directions for experimentation.

Computers provide a rare opportunity to encourage learning through discovery. Allow students to explore the capabilities of their computers; they cannot harm them by pressing the keys. Feel free to let students do the lessons independently. Answer their questions with questions of your own. This encourages discovery.

You should become as familiar as you can with the operation of your computer. Read the manual that accompanies it to be sure you know the functions of special keys. For example, you must hit the `RETURN/ENTER` key after you type each statement into the computer. Another key, usually the break key, will break a loop if a program gets caught in one. A quick glance through this text will provide you with an idea as to which keys you will most need to be familiar with.

The command to clear the screen allows students to see output on a screen that has been cleared of previously entered data. For Apple computers, the command is `HOME`; for the TRS-80 and IBM computers, `CLS`; for Commodore 64, `PRINT` ‘‘ ♥ ’’; for PET, `PRINT` ‘‘🅂’’. The first line of each program should have the clear command. Since this varies among computers, it is indicated by “[clear screen]” for each line number 5 in the lessons. Because this command is so often used, you might write the appropriate version for your computer on the blackboard or post it somewhere prominently for your students to refer to.

If you use *A Self-Teaching Guide to BASIC* as a text, have students predict the output of each problem before they work it out on the computer. Ample space has been left to the right of each problem for student answers. `LIST` means to write out the program in numbered steps. `RUN` means to write the output that the program would produce. The answer key suggests a solution for each problem, but it is only a guide. Students will discover other solutions that are also correct. Should you wish that your students not see the answers, the answer key may easily be removed by taking off the spiral binding, taking out the answers, and reattaching the binding.

All the lessons follow the same pattern, so a closer look at Lessons 1 and 2 will give you a good idea of standard procedures to follow and typical problems for which you should be prepared.

LESSON 1

Show students how to turn on the computer. Demonstrate each step. If the computer has a disk drive, show students how to control it.

Walk around and watch for typing errors. For example, students often forget to type `PRINT` or the ‘ ‘ symbols. They also frequently substitute `O` for `Ø` and `I` for `1`. Mention that line numbers can be any value as long as they increase in value.

Students should "play computer"—that is, trace a program—before they try it on a computer. This may be assigned as homework, and it is especially useful if there are not enough computers for every student. Let's play computer with the program in Lesson 1:

`5 [clear screen]`	tells the computer to clear the screen.
`1Ø PRINT ‘‘STEVE’’`	tells the computer to print `STEVE`. The computer prints anything between quotes.
`2Ø PRINT ‘‘WAS’’`	tells the computer to print `WAS` just below `STEVE`.
`3Ø PRINT ‘‘HERE’’`	tells the computer to print `HERE` just below `WAS`.
`4Ø END`	tells the computer that this is the end of the program.
`RUN`	is a command that is not numbered. It tells the computer to perform the lines of the program in order. In this case, the program will produce this output:

```
STEVE
WAS
HERE
```

In problem 4, many students make the mistake of erasing `35 PRINT ‘‘YESTERDAY’’` by typing `35 PRINT ‘‘ ’’`. Students may also ask if they can use odd line numbers to insert blanks in the output. Tell them to try and see. (In the answer key, all `PRINT` statements used for spacing contain quotes. When your students discover that `1Ø PRINT` also prints a blank space, it is perfectly permissible for them to incorporate it into their subsequent answers. The same applies to `?` used instead of `PRINT`. At some point, you may wish to hint, especially to your slower students, that these shortcuts are possible.)

Problems 7 and 8 are valuable because they allow students to experiment with their own programs on the computer. Be sure students complete Lesson 1 before going to Lesson 2.

LESSON 2

Be sure that students don't forget to type semicolons where needed.

Problem 6 is an example of how different solutions may be equally correct. Students may use `1Ø PRINT ‘‘REAL’’;` or `1Ø PRINT ‘‘REAL MATH’’` and delete line `2Ø`. Both solutions are correct.

The computer's output for problem 10 may confuse students if they forget to type the NEW command at the beginning of the program. Otherwise, lines 25 and 4Ø from the program in problem 9 still operate. The students learned this command in Lesson 1, and they should use it throughout the lessons whenever they type a completely new program into the computer. This is an example of how the lessons build on each other to teach computer skills.

Problems 12 through 16—like problem 6—can be solved in different ways. Once again, student answers may be completely different, yet equally correct.

A Self-Teaching Guide to BASIC will stimulate your students to discover individual approaches to problems. Students will be excited and encouraged by learning their own capabilities as they learn the computer's.

8-25-80

Must put in
System Master 1st.
DOS VERSION 3 3

Type in CATALOG
get menu
Type in RUN HELLO
then can do next page.

PRINT Statements

The PRINT command tells the computer to display characters enclosed in quotes exactly as typed. The computer will ignore extra spaces typed in a statement unless the spaces are enclosed within quotes. For example:

```
12 PRINT ''STEVE''
```

If the first quote is missing, a syntax error will result. If the last quote is missing, it will usually not affect the output, but both quotes should always be included.

Control reset fast!

LESSON 1

Write the output the computer will give for each LIST and RUN command.

Type in the program:

```
5 [clear screen]
1Ø PRINT ‘‘STEVE’’
2Ø PRINT ‘‘WAS’’
3Ø PRINT ‘‘HERE’’
4Ø END
RUN
```

Type in the following statements:

1.
```
1Ø PRINT ‘‘MOM’’
RUN
```

2.
```
35 PRINT ‘‘YESTERDAY’’
RUN
```

3.
```
15 PRINT ‘‘   ’’
RUN
```

Puts spaces between lines.

4. **Put spaces between the other lines.**

```
LIST
```

Type in the following statements:

5. `2Ø`

   ```
   LIST
   ```

6. `5`

   ```
   RUN
   ```

7.
   ```
   NEW
   LIST
   RUN
   ```

8. **Write your own message program.**

   ```
   LIST
   RUN
   ```

9. **Put spaces between the lines.**

   ```
   LIST
   ```

must use System Master

Statements with Semicolons (;)

Semicolons are used to print things on the same line with no spaces. For example:

```
1Ø PRINT ‘‘BACK’’
2Ø PRINT ‘‘HAND’’
3Ø END
```

Type in RUN @ end.

will print:

```
BACK
HAND
```

Using

```
1Ø PRINT ‘‘BACK’’;
2Ø PRINT ‘‘HAND’’
```

will print:

```
BACKHAND
```

LESSON 2

Write the output the computer will give for each LIST and RUN command.

Type in the program:

```
NEW

5 [clear screen]
1Ø PRINT ‘‘REAL’’
2Ø PRINT ‘‘MATH’’
3Ø PRINT ‘‘IS’’
4Ø PRINT ‘‘GREAT’’
5Ø END

RUN
```

Type in the following statements:

1.
```
1Ø PRINT ‘‘REAL ’’;

RUN
```

2.
```
1Ø PRINT ‘‘R EAL ’’;

RUN
```

3.
```
1Ø PRINT ‘‘RE AL ’’;

RUN
```

4.
```
1Ø PRINT ‘‘REA L ’’;

RUN
```

Change the program to produce the following outputs:

5.
```
REAL MATH
IS
GREAT

LIST
```

6.
```
REAL MATH
    IS
GREAT

LIST
```

7.
```
REAL MATH
    IS
  GREAT

LIST
```

8.
```
REAL MATH

    IS

  GREAT

LIST
```

9.
```
REAL MATH

IS GREAT

LIST
```

10. **Type in the program:**

```
5 [clear screen]
1Ø PRINT ‘‘*’’
2Ø PRINT ‘‘*’’
3Ø PRINT ‘‘*’’
55 END

RUN
```

11. **Type the statement:**

```
1∅ PRINT ‘‘*’’;
RUN
```

Change the program to produce the following outputs:

12.

```
**
 *

LIST
```

13.

```
***
LIST
```

14.

```
* **
LIST
```

15.

```
** *
LIST
```

16.

```
* * *
LIST
```

LESSON 3

Write the output the computer will give for each LIST and RUN command.

Type in the program:

```
5 [clear screen]
1Ø PRINT ‘‘HELLO’’
2Ø PRINT ‘‘TEACHER’’
3Ø PRINT ‘‘MATH’’
4Ø PRINT ‘‘IS’’
5Ø PRINT ‘‘GREAT’’
6Ø END

RUN
```

1. **Make the output read:**

```
  HELLO
TEACHER
  MATH
   IS
 GREAT

LIST
```

Type in the following statements:

2.
```
3Ø PRINT ‘‘NEBRASKA’’

RUN
```

3.
```
1Ø PRINT ‘‘ HELLO’’;

LIST
```

4. **Make a space between** HELLO **and** TEACHER.

```
LIST

RUN
```

5. **Make a space between the lines:**

```
HELLO TEACHER

  NEBRASKA

     IS

   GREAT

LIST
```

6. **Type in the program:**

```
5 [clear screen]
1Ø PRINT ''*''
2Ø PRINT ''**''
4Ø END

RUN
```

Make the following designs:

7.
```
*
* *
* * *

LIST
```

8.
```
    *
  * *
* * *

LIST
```

9.
```
    *
  * * *
* * * * *
    *
    *

LIST
```

10. **Make your own design.**

```
LIST
```

IF/THEN, LET, and GOTO Statements

IF/THEN

The IF/THEN command allows one to transfer to a different line under a specific condition.

```
1Ø IF C = 7 THEN 7Ø
```

will transfer to line number 7Ø when C = 7. Otherwise, the computer will drop to the next command.

LET

The LET command instructs the computer to place the value in the right side in the variable on the left side.

```
1Ø LET C = 1
```

will place a 1 in the location C.

GOTO

The GOTO statement instructs the computer to transfer to a specific line.

```
5Ø GOTO 2Ø
```

instructs the computer to go to line number 2Ø.

LESSON 4

Write the output the computer will give for each `LIST` and `RUN` command.

Type in the program:

```
5 [clear screen]
1Ø LET C = 1
2Ø PRINT ‘‘I LOVE MATH’’
3Ø IF C = 7 THEN 7Ø
4Ø LET C = C + 1
5Ø GOTO 2Ø
7Ø END

RUN
```

1. **Make the program print** `I LOVE MATH` **5 times.**

   `LIST`

2. **Make the program print** `I LOVE MATH` **12 times.**

   `LIST`

3. **Make the program print across instead of down the screen.**

   `LIST`

4. **Make it print** `I LOVE MATH` **100 times.**

   `LIST`

5. **Make it print** `I LOVE MATH` **1000 times.**

   `LIST`

6. **Make the program print** `I LOVE MATH` **down the screen 15 times.**

   `LIST`

7. **Make the program print the output in the middle of the screen.**

```
LIST
```

8. **Put spaces between the lines.**

```
LIST
```

9. **Type in this program:**

```
5 [clear screen]
1Ø LET C = 1
2Ø PRINT C
3Ø IF C = 1Ø THEN 7Ø
4Ø LET C = C + 1
5Ø GOTO 2Ø
7Ø END

RUN
```

10. **Make the program count to 15.**

```
LIST
```

11. **Make the program print the numbers across the screen.**

```
LIST
```

12. **Type this statement:**

```
25 PRINT ‘‘   ’’;

RUN
```

13. **Make the program count to 1000 across the screen.**

```
LIST
```

LESSON 5

Write the output the computer will give for each LIST and RUN command.

Type in the program:

```
5 [clear screen]
1Ø LET C = 1
2Ø PRINT C
3Ø IF C = 4 THEN 6Ø
4Ø LET C = C + 1
5Ø GOTO 2Ø
6Ø END

RUN
```

Make the program count:

1.

```
1
2
3
4
5
6
7

LIST
```

2.

```
1
2
3
4
5

LIST
```

3. **Put spaces between the numbers:**

```
1

2

3

4

5

LIST
```

PRINT **across the screen:**

4.
```
12345
LIST
```

5.
```
1234567
LIST
```

6.
```
1 2 3 4 5 6 7
LIST
```

7. Make the program count to 15.
```
LIST
```

8. Make the program count to 30.
```
LIST
```

9. Make the program count down the screen to 30:
```
1
2
3
.
.
.
3Ø
LIST
```

LESSON 6

Write the output the computer will give for each `LIST` and `RUN` command.

Type in the program:

```
5 [clear screen]
1Ø LET C = Ø
2Ø PRINT C
3Ø IF C = 7 THEN 6Ø
4Ø LET C = C + 1
5Ø GOTO 2Ø
6Ø END

RUN
```

1. **Make the program start the count at 5.**

```
LIST
```

2. **Make the count start at 2.**

```
LIST
```

3. **Make it start at 6.**

```
LIST
```

4. **Make it start at 3.**

```
LIST
```

5. **Type the statement:**

```
4Ø LET C = C + 2

RUN
```

6. **Make the count start at 1 and end at 9.**

```
LIST
```

7. **Make the count start at 2 and end at 14.**

```
LIST
```

8. **Make it start at 3 and count by 3.**

```
LIST
```

9. **Make it start at 3 and count by 5.**

```
LIST
```

10. **Make it start at 3 and count by 7.**

```
LIST
```

11. **Make it count to 259 by 7.**

```
LIST
```

12. **Make it count to 756 by 7.**

```
LIST
```

LESSON 7

Write the output the computer will give for each `LIST` and `RUN` command.

Type in the program (use your own name where ''YOUR NAME'' is written):

```
5 [clear screen]
1Ø LET C = 4
2Ø PRINT ''YOUR NAME''
3Ø IF C = 7 THEN 6Ø
4Ø LET C = C + 1
5Ø GOTO 2Ø
6Ø END

RUN
```

1. **Make the program print your name 5 times.**

   ```
   LIST
   ```

2. **Make it print your name 10 times.**

   ```
   LIST
   ```

3. **Make it print your name 10 times across the screen.**

   ```
   LIST
   ```

4. **Make it print your name 100 times across the screen.**

```
LIST
```

5. **Make the output print down the screen.**

```
LIST
```

6. **Make spaces between the lines.**

```
LIST
```

7. **Type the statement:**

```
2ø PRINT C
RUN
```

LESSON 8

Write the output the computer will give for each LIST and RUN command.

Type in the program:

```
5 [clear screen]
1∅ LET C = 1
2∅ PRINT C
3∅ IF C = 7 THEN 6∅
4∅ LET C = C + 1
5∅ GOTO 2∅
6∅ END

RUN
```

Change the program to produce the following outputs:

1.
```
2
3
4
5
6
7

LIST
```

2.
```
4
5
6
7

LIST
```

3.
```
4
5
6
7
8
9

LIST
```

4.
```
6
7
8
9
1Ø
11
12
```

```
LIST
```

5.
```
1Ø
11
12
```

```
LIST
```

6. **Make the output of problem 5 print across the page.**

```
LIST
```

Change the program to produce the following outputs:

7.
```
2 4 6 8 1Ø 12
```

```
LIST
```

8.
```
3 6 9 12
```

```
LIST
```

9.
```
4  8  12
```

```
LIST
```

10.
```
21  42  63  84
```

```
LIST
```

LESSON 9

Write the output the computer will give for each `LIST` and `RUN` command.

Type in the program:

```
5 [clear screen]
1∅ LET C = 1
2∅ PRINT C
3∅ IF C = 6 THEN 6∅
4∅ LET C = C + 1
5∅ GOTO 2∅
6∅ END

RUN
```

Change the program to produce the following outputs:

1.
```
2 4 6 8

LIST
```

2.
```
3 5 7 9 11

LIST
```

3.
```
5 8 11 14 17

LIST
```

4.
```
11 17 23 29 35

LIST
```

5.
```
1 2 3 4 5 6 7 8

LIST
```

6.
```
8 7 6 5 4 3 2 1

LIST
```

7.
```
3 4 5 6 7 8

LIST
```

8.
```
8 7 6 5 4 3
```
```
LIST
```

9.
```
2 4 6 8 1Ø
```
```
LIST
```

10.
```
12 1Ø 8 6 4 2
```
```
LIST
```

11.
```
11 9 7 5 3
```
```
LIST
```

12.
```
35 29 23 17 11
```
```
LIST
```

13. **Make the program print your name 7 times.**
```
LIST
```

14. **Put spaces between the lines.**
```
LIST
```

15. **Make the program number the lines:**
```
1 STEVE
2 STEVE
3 STEVE
```
```
LIST
```

16. **Make the program place a period after the number:**
```
1. STEVE
2. STEVE
3. STEVE
```
```
LIST
```

LESSON 10

Write the output the computer will give for each LIST and RUN command.

Type in the program:

```
5 [clear screen]
1Ø LET C = 1
2Ø PRINT C
3Ø LET C = C + 1
4Ø IF C < 6 THEN 2Ø
9Ø END
```

```
RUN
```

Change the program to produce the following outputs:

1. `1 2 3 4 5 6 7 8`

```
LIST
```

2. `4 5 6 7`

```
LIST
```

3. `2 4 6 8`

```
LIST
```

4. `3 5 7 9`

```
LIST
```

5. **Have the program count by 5 from 6 to 46.**

```
LIST
```

6. **Have the program count by 8 from 7 to 79.**

```
LIST
```

Type in the program:

```
5 [clear screen]
15 LET C = 1
25 PRINT C
35 IF C > 6 THEN 7Ø
45 LET C = C + 1
55 GOTO 25
7Ø END

RUN
```

Change the program to produce the following outputs:

7. `2  4  6  8  1Ø  12`

```
LIST
```

8. `3  5  7  9  11`

```
LIST
```

9. **Have the program count by 5 from 6 to 46.**

```
LIST
```

10. **Have the program count by 8 from 7 to 79.**

```
LIST
```

INT( ) and RND(1) Statements

INT( )

The INT function selects the integer segment of a number by dropping everything to the right of the decimal point.

X = INT(2.72) would give X = 2.
X = INT(13.24) would give X = 13.

RND(1)

The RND function randomly generates a number between 0 and 1. (**Note:** For Radio Shack computers, all RND (1) statements should be changed to RND (Ø).)

LESSON 11

Write the output the computer will give for each LIST and RUN command. (*Note:* For Radio Shack computers change the RND(1) statements to RND(Ø).)

Type in the program:

```
5 [clear screen]
1Ø LET C = Ø
2Ø LET X = INT(1Ø * RND(1))
3Ø PRINT X
4Ø LET C = C + 1
5Ø IF C < 11 THEN 2Ø
7Ø END
```

RUN the programs in each of the following problems 4 times and record the smallest and largest numbers generated each time.

1ST *2ND* *3RD* *4TH*

1. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

Make the program for numbers 0 to 8.

2. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the program for numbers 0 to 7.

3. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Type the statement:

```
2Ø LET X = INT(1Ø * RND(1)) + 1
```

4. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
RUN
```

1ST *2ND* *3RD* *4TH*

Make the program for numbers 1 to 9.

5. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make it for 1 to 8.

6. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the output 0 to 5.

7. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the output 1 to 6.

8. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the output for 20 numbers 1 to 3.

9. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the output 0 to 2.

10. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

LESSON 12

Write the output the computer will give for each LIST and RUN command. (**Note:** For Radio Shack computers change the RND(1) statements to RND(Ø).)

Type in the program:

```
5 [clear screen]
8 LET C = Ø
1Ø LET X = 5
2Ø LET Y = INT(5 * RND(1)) + 1
25 PRINT ‘‘WHAT IS THE PRODUCT?’’
3Ø PRINT ‘‘   ’’;X
4Ø PRINT ‘‘X’’Y
5Ø LET S = X * Y
6Ø INPUT G
7Ø IF S = G THEN 11Ø
8Ø PRINT ‘‘WRONG’’
1ØØ GOTO 25
11Ø PRINT ‘‘GOOD WORK’’
12Ø LET C = C + 1
13Ø IF C = 4 THEN 14Ø
135 GOTO 2Ø
14Ø END
```

Change the program to produce the following outputs:

1. VERY NICE WORK

   LIST

2. WRONG, TRY AGAIN PLEASE.

   LIST

3. **Make the multiplicand 4.**

   LIST

4. **Make the multiplicand 7.**

   LIST

5. **Make the multiplicand 3.**

   LIST

6. **Make the multipliers 0 to 4.**

   LIST

7. **Make the multipliers 0 to 6.**

```
LIST
```

8. **Make the multipliers 1 to 6.**

```
LIST
```

9. **Write the program to have 3 problems.**

```
LIST
```

10. **Write the program to have 5 problems.**

```
LIST
```

11. **Make it have 10 problems.**

```
LIST
```

12. **Type in these statements:**

```
6 PRINT ‘‘WHAT IS YOUR NAME?’’
7 INPUT A$
25 PRINT ‘‘WHAT IS THE PRODUCT ’’;A$
RUN
```

13. **Change the program to add and to print:**

```
(your name), VERY NICE WORK
LIST
```

14. **Have the program print:**

```
WRONG, (your name), TRY AGAIN PLEASE
LIST
```

15. **Make it have 4 problems.**

```
LIST
```

16. **Make the upper addend vary from 0 to 4.**

```
LIST
```

17. **Make the lower addend vary from 1 to 6.**

```
LIST
```

LESSON 13

Write the output the computer will give for each `LIST` and `RUN` command. (*Note:* For Radio Shack computers change the `RND(1)` statements to `RND(Ø)`.)

Type in the program:

```
5 [clear screen]
1Ø LET C = Ø
15 LET C = C + 1
2Ø LET X = INT(1Ø * RND(1))
3Ø PRINT X
4Ø LET C = C + 1
5Ø IF C < 11 THEN 2Ø
6Ø END
```

`RUN` the programs in each of the following problems 4 times and record the smallest and largest numbers generated each time.

1ST *2ND* *3RD* *4TH*

1. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
RUN
```

Output the numbers 0 to 8.

2. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Output the numbers 1 to 9.

3. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Output the numbers 2 to 10.

4. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

1ST *2ND* *3RD* *4TH*

Output the numbers 3 to 11.

5. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the numbers 0 to 5.

6. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the numbers 1 to 6.

7. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the numbers 10 to 15.

8. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Make the numbers 12 to 17.

9. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

Output the numbers 10 to 17.

10. smallest ________ ________ ________ ________

largest ________ ________ ________ ________

```
LIST
```

LESSON 14

Write the output the computer will give for each LIST and RUN command.

Type in the following program:

```
5 [clear screen]
1ø LET X = 1
2ø LET T = 1
3ø PRINT TAB(T);
4ø PRINT ‘‘ * ’’;
5ø IF X = 6 THEN 8ø
6ø LET X = X + 1
7ø GOTO 4ø
8ø PRINT ‘‘GOOD WORK’’
9ø END

RUN
```

1. **Type in these statements:**

```
5ø IF X = 6 THEN 75
75 PRINT ‘‘   ’’

RUN
```

2. **Change the output to:**

```
******

GOOD WORK

LIST
```

Type in the following statements:

3. 2ø LET T = 1ø

   RUN

4. 2ø LET T = 2ø

   RUN

5. 2ø LET T = 3ø

   RUN

Change the program to produce the following outputs:

6.
```
            ******
GOOD WORK

LIST
```

7.
```
            *****

GOOD WORK

LIST
```

8.
```
****

GOOD WORK

LIST
```

9.
```
*******

GOOD WORK

LIST
```

10. **Type in these statements:**

```
4Ø PRINT ‘ ‘ * ’ ’
7Ø GOTO 3Ø

RUN
```

Change the program to produce the following outputs:

11.
```
     *
     *
     *
     *
     *
     *

GOOD WORK

LIST
```

12.

```
        *
        *
        *
        *
        *
        *
GOOD WORK

LIST
```

13. **Type in these statements:**

```
2Ø LET T = 1
55 LET T = T + 1

RUN
```

Change the program to produce the following outputs:

14.

```
        *
         *
          *
           *
            *
             *
GOOD WORK

LIST
```

15.

```
        *
        *
        *
        *
        *
        *
GOOD WORK

LIST
```

16.

```
    **
     **
      **
       **
        **
         **
GOOD WORK

LIST
```

17.

```
         **
          **
           **
            **
             **
              **
GOOD WORK
LIST
```

18.

```
         *
         *
         *
         *
         *
         *
GOOD WORK
LIST
```

19.

```
         *
        *
       *
      *
     *
    *
GOOD WORK
LIST
```

20.

```
         **
        **
       **
      **
     **
    **
GOOD WORK
LIST
```

LESSON 15

Write the output the computer will give for each `LIST` and `RUN` command.

1. **Write a program to print:**

```
AWESOME
AWESOME
AWESOME
AWESOME
AWESOME
```

```
LIST
```

2. **Make the program print in the middle of the screen.**

```
LIST
```

3. **Make the program print in the far right of the screen.**

```
LIST
```

4. **Make the program print in the far left of the screen.**

```
LIST
```

Change the program to produce the following outputs:

5. `AWESOME AWESOME AWESOME AWESOME AWESOME`

```
LIST
```

6. `AWESOME AWESOME AWESOME AWESOME`

```
LIST
```

7. **Make the program print down the screen.**

```
LIST
```

Change the program to produce the following outputs:

8.

```
AWESOME
 AWESOME
  AWESOME
   AWESOME
```

```
LIST
```

9.

```
AWESOME
  AWESOME
    AWESOME
      AWESOME

LIST
```

10.

```
AWESOME    AWESOME
   AWESOME    AWESOME
      AWESOME    AWESOME
         AWESOME    AWESOME

LIST
```

11.

```
AWESOME
AWESOME
AWESOME
AWESOME

LIST
```

12.

```
   AWESOME
  AWESOME
 AWESOME
AWESOME

LIST
```

13.

```
      AWESOME
    AWESOME
  AWESOME
AWESOME

LIST
```

14. **Make the program print in the far right of the screen.**

```
LIST
```

Change the program to produce the following outputs:

15.

```
AWESOME
 AWESOME
  AWESOME
   AWESOME

LIST
```

16.

```
AWESOME
AWESOME
 AWESOME
  AWESOME

LIST
```

LESSON 16

Write the output the computer will give for each LIST and RUN command.

Type in the following program:

```
5 [clear screen]
1Ø PRINT ''WHICH KEYBOARD CHARACTER WOULD YOU LIKE TO USE'';
2Ø INPUT A$
3Ø LET X = 1
4Ø LET T = 1
5Ø PRINT TAB(T);
6Ø PRINT A$;
7Ø IF X = 6 THEN 1ØØ
8Ø LET X = X + 1
9Ø GOTO 6Ø
1ØØ PRINT ''GOOD WORK''
11Ø END
```

```
RUN
```

1. **Type in these statements:**

```
7Ø IF X = 6 THEN 95
95 PRINT ''   ''
```

```
RUN
```

Make the following patterns:

2.
```
++++++
GOOD WORK
LIST
```

3.
```
++++++++++++
GOOD WORK
LIST
```

4.
```
        $$$$$$
GOOD WORK
LIST
```

5.
```
        $ $ $ $ $ $
GOOD WORK
LIST
```

6.

```
        $+ $+ $+ $+ $+ $+
GOOD WORK
LIST
```

7.

```
*
*
*
*
*
*
GOOD WORK
LIST
```

8.

```
    *
    *
    *
    *
    *
    *
GOOD WORK
LIST
```

9.

```
        *
        *
        *
        *
        *
        *
GOOD WORK
LIST
```

10.

```
    MATH
     MATH
      MATH
       MATH
        MATH
         MATH
GOOD WORK
LIST
```

11.

```
              +
             +
            +
           +
          +
         +
GOOD WORK

LIST
```

12.

```
      1.
      2.
      3.
      4.
      5.
      6.
TERRIFIC

LIST
```

13.

```
           1.+
          2.+
         3.+
        4.+
       5.+
      6.+
TERRIFIC

LIST
```

14.

```
                1.
              2.
            3.
          4.
        5.
      6.
TERRIFIC

LIST
```

FOR/NEXT and STEP Statements

FOR/NEXT

The FOR/NEXT statement is a built-in counter.

```
1Ø FOR N = 1 TO 4
2Ø PRINT ‘‘NICE’’
3Ø NEXT N
```

This program would print NICE 4 times. The NEXT is like a GOTO statement. The NEXT sends the program back to the FOR statement, which keeps track of the count. The statement counts by 1 each time unless directed otherwise. The count starts with the first number and ends with the second value.

STEP

```
FOR N = 1 TO 5 STEP 2
.
.
.
NEXT N
```

counts 1, 3, 5. The STEP indicates what amount to count by. If the STEP is left out, the computer automatically counts by 1.

LESSON 17

Write the output the computer will give for each `LIST` and `RUN` command.

Type in the program:

```
5 [clear screen]
1Ø PRINT ‘‘WHICH KEYBOARD CHARACTER WOULD YOU LIKE TO USE’’
2Ø INPUT A$
3Ø FOR N = 1 TO 6 STEP 1
4Ø PRINT A$;
5Ø NEXT N
6Ø END
```

Output the following patterns:

1.

```
        ++++++
LIST
```

2.

```
        **
LIST
```

3.

```
        ++++++++++
LIST
```

4.

```
        +++++++++++++++
LIST
```

5. How many $ symbols fit on one line of the screen?

```
$$$$$$$$$$$$$$$$$$. . .
```

6. Make this pattern:

```
          *
          *
          *
          *
          *
          *
LIST
```

7. Enter this statement:

```
25 [clear screen]
RUN
```

8. **Make the program count to the bottom of the screen.**

```
LIST
```

9. **How many * symbols can go down the screen?**

```
LIST
```

10. **Enter this statement:**

```
4Ø PRINT N
RUN
```

Make the following patterns:

11.

```
1*
2*
3*
4*
5*
6*
LIST
```

12.

```
1.*
2.*
3.*
4.*
5.*
6.*
LIST
```

13. **Type this statement:**

```
3Ø FOR N = 3 TO 6 STEP 1
RUN
```

14. **Make the program count from 7 to 13.**

```
LIST
```

15. **Type the following statements:**

```
7 LET T = 5
28 PRINT TAB(T);
RUN
```

16.
```
32 PRINT TAB(T);
RUN
```

17.
```
28
RUN
```

18.
```
7 LET T = 1Ø
RUN
```

19.
```
35 T = T + 1
RUN
```

Make the following patterns:

20.
```
          7$
           8$
            9$
             10$
              11$
               12$
                13$
LIST
```

21.
```
          7FROG
           8FROG
            9FROG
             10FROG
               11FROG
                 12FROG
                   13FROG
LIST
```

22.
```
         2
         3
         4
         5
TERRIFIC
LIST
```

LESSON 18

Write the output the computer will give for each LIST and RUN command.

Type in the program:

```
5 [clear screen]
1∅ PRINT ''TYPE A NUMBER'';
2∅ INPUT A
3∅ FOR N = 1 TO 4 STEP 1
4∅ PRINT A
5∅ NEXT N
6∅ END
```

1. **Make this pattern.**

```
    7
    7
    7
    7
    7
```

LIST

2. **Make it print in the middle of the screen using a TAB statement.**

LIST

3. **Print this pattern:**

```
77777
```

LIST

4. **Type this command:**

```
25 [clear screen]
```

RUN

5. **Type this statement:**

```
4∅ PRINT N;
```

RUN

6. **Make this pattern:**

```
1 2 3 4 5 6 7 8 9
```

```
LIST
```

7. **Make it print at the left side of the screen.**

```
LIST
```

8. **Type this statement:**

```
4ø PRINT N

RUN
```

9. **Print the output in the middle of the screen.**

```
LIST
```

10. **Type this statement:**

```
45 PRINT T = T + 1
RUN
```

11. **Print this pattern:**

```
    3
     4
      5
       6
        7
```

```
LIST
```

Type these statements:

12.

```
3ø FOR N = 3 TO 7 STEP 2

RUN
```

13. `3∅ FOR N = 1 TO 9 STEP 2`

```
RUN
```

Output these patterns:

14. `13579`

```
RUN
```

15. `25811`

```
RUN
```

16. `2  5  8  11`

```
RUN
```

17. `9  14  19  24  29`

```
RUN
```

18. **Make the output start at 8 and count by 3 to 26.**

```
LIST
```

19. **Make the output start at 5 and count by 4 to 45.**

```
LIST
```

20. **Make the output start at 7 and count by 8 to 79.**

```
LIST
```

LESSON 19

Write the output the computer will give for each LIST and RUN command.

Type in the program:

```
5 [clear screen]
1Ø FOR N = 1 TO 5
2Ø PRINT ‘‘ ’’
3Ø NEXT N
4Ø PRINT ‘‘TIME’’
5Ø END

RUN
```

1. **Type this statement:**

```
1Ø FOR N = 1 TO 1Ø

RUN
```

2. **Make TIME print in the lower left corner of the screen.**

```
LIST
```

3. **Type these statements:**

```
7 LET T = 1
35 PRINT TAB(T);

RUN
```

4. **Type this statement:**

```
7 LET T = 15

RUN
```

5. **Make TIME print in the lower right of the screen.**

```
LIST
```

6. **Make TIME print as far right as possible.**

```
LIST
```

7. **Make the output in the middle of the screen and to the right.**

```
LIST
```

8. **Make the output in the middle of the screen and to the left.**

```
LIST
```

9. **Make the output in the center of the screen.**

```
LIST
```

10. **Type this statement:**

```
1Ø FOR N = 1 TO 1ØØ
```

RUN — *How long does it take? Time it.*

11. **Make it take 5 seconds.**

```
LIST
```

12. **Make it take 10 seconds.**

```
LIST
```

Type the following statements and tell how long the programs take to RUN.

13.
```
2Ø PRINT ''your name''
RUN
```

14.
```
25 PRINT ''a different name''
RUN
```

15.
```
27 PRINT ''another name''
RUN
```

16.
```
25 PRINT ''another name'';
RUN
```

17.
```
27 PRINT ''your name'';
RUN
```

18.
```
2Ø
25
27
RUN
```

LESSON 20

Write the output the computer will give for each `LIST` and `RUN` command.

Type in the program:

```
5 [clear screen]
1Ø PRINT ‘‘WHICH KEYBOARD CHARACTER DO YOU WANT TO USE’’;
2Ø INPUT A$
4Ø FOR N = 1 TO 4
5Ø PRINT
6Ø NEXT N
7Ø FOR J = 1 TO 5 STEP 2
8Ø PRINT A$;J
9Ø NEXT J
1ØØ END
```

Make the following patterns:

1.

```
*1
*3
*5
*7
*9
```

```
LIST
```

2.

```
1
3
5
7
9
```

```
LIST
```

3.

```
1*
3*
5*
```

```
LIST
```

4.

```
1**
3**
5**
```

```
LIST
```

5. **Type these statements:**

```
25 LET T = 1Ø
72 PRINT TAB(T);

RUN
```

6. **Have the numbers printed in column 20 at the bottom of the screen.**

```
LIST
```

7. **Print this pattern in the center of the screen:**

```
   3.
   7.
   11.
   15.

LIST
```

8. **Type this statement:**

```
82 LET T = T + 1

RUN
```

Make these outputs:

9.
```
   2.
     7.
       12.
          17.

LIST
```

10.

```
     3.
    5.
   7.
to 15.

LIST
```

11. Type these statements:

```
28 LET C = 1Ø
8Ø PRINT C
84 LET C = C + 1

RUN
```

Make these patterns:

12.

```
   4.
   6.
   8.
   1Ø.

LIST
```

13.

```
      1Ø
      9
     8
    7
   6

LIST
```

LESSON 21

Write the output the computer will give for each `LIST` and `RUN` command.

Type in the program:

```
5 [clear screen]
1Ø PRINT ‘‘TYPE SOMETHING’’
2Ø INPUT A$
3Ø LET T = 5
4Ø FOR N = 1 TO 4
5Ø PRINT
6Ø NEXT N
7Ø FOR J = 1 TO 9 STEP 2
8Ø PRINT TAB(T);T
9Ø LET T = T + 1
1ØØ NEXT J
11Ø END

RUN
```

Enter the following statements:

1.
```
9Ø LET T = T + 2

RUN
```

2.
```
8Ø PRINT TAB(T);A$

RUN
```

3.
```
8Ø PRINT TAB(T);J

RUN
```

4.
```
25 LET C = 9
8Ø PRINT TAB(T);J;C

RUN
```

5.
```
8Ø PRINT TAB(T);J;A$
85 LET C = C + 1

RUN
```

Output the following patterns:

6.

```
   5
     7
       9
         11

LIST
```

7.

```
   5*
      7*
         9*
            11*
LIST
```

8.

```
   5*1
     7*2
       9*3
         11*4
           13*5
LIST
```

9.

```
   53
    74
     95
      116
LIST
```

10.

```
     55
    74
   93
LIST
```

Enter the following statements:

11.
```
25 LET C = 1
75 LET S = C * T
8Ø PRINT C,T,S
85 LET C = C + 1
RUN
```

12.
```
9Ø LET T = T
RUN
```

Change the program to produce the following outputs:

13.
```
   1          3          3
   2          4          8
   3          5          15
   4          6          24

LIST
```

14.
```
   2          3          6
   3          4          12
   4          5          2Ø
   5          6          3Ø

LIST
```

15.
```
   3          3          9
   4          4          16
   5          5          25
   6          6          36

LIST
```

16.
```
   1          6          6
   2          5          1Ø
   3          4          12
   4          3          12

LIST
```

17.

```
     3        8        24
     5        6        3Ø
     7        4        28
     9        2        18
     11       Ø        Ø

 LIST
```

18.

```
     6
     15
     2Ø
     21

 LIST
```

19.

```
     49
     58
     67
     76

 LIST
```

20.

```
     36
     4Ø
     42
     42

 LIST
```

21.

```
     15
     28
     45
     66

 LIST
```

ANSWERS

LESSON 1

```
                  STEVE
                  WAS
                  HERE
```

1.
```
MOM
WAS
HERE
```

2.
```
MOM
WAS
HERE
YESTERDAY
```

3.
```
MOM

WAS
HERE
YESTERDAY
```

4.
```
5 [clear screen]
1Ø PRINT ‘‘MOM’’
15 PRINT ‘‘    ’’
2Ø PRINT ‘‘WAS’’
25 PRINT ‘‘    ’’
3Ø PRINT ‘‘HERE’’
32 PRINT ‘‘    ’’
35 PRINT ‘‘YESTERDAY’’
4Ø END
```

5.
```
5 [clear screen]
1Ø PRINT ‘‘MOM’’
15 PRINT ‘‘    ’’
25 PRINT ‘‘    ’’
3Ø PRINT ‘‘HERE’’
32 PRINT ‘‘    ’’
35 PRINT ‘‘YESTERDAY’’
4Ø END
```

6. The program in problem 5 runs without clearing the screen.

7. The program has been deleted from memory. LIST and RUN do not produce output at this time since a program does not exist in memory.

8 and 9. Student programs will vary, but they should be based on the programs above.

LESSON 2

```
                REAL
                MATH
                IS
                GREAT
```

1.
```
REAL MATH
IS
GREAT
```

2.
```
R EAL  MATH
IS
GREAT
```

3.
```
RE AL  MATH
IS
GREAT
```

4.
```
REA L  MATH
IS
GREAT
```

LESSON 2 (Continued)

5.
```
5 [clear screen]
1Ø PRINT ‘‘REAL ’’;
2Ø PRINT ‘‘MATH’’
3Ø PRINT ‘‘IS’’
4Ø PRINT ‘‘GREAT’’
5Ø END
```

Some students will write the program as:

```
5 [clear screen]
1Ø ‘‘PRINT ‘‘REAL MATH’’
3Ø PRINT ‘‘IS’’
4Ø PRINT ‘‘GREAT’’
5Ø END
```

6.
```
5 [clear screen]
1Ø PRINT ‘‘REAL ’’;
2Ø PRINT ‘‘MATH’’
3Ø PRINT ‘‘    IS’’
4Ø PRINT ‘‘GREAT’’
5Ø END
```

7.
```
5 [clear screen]
1Ø PRINT ‘‘REAL ’’;
2Ø PRINT ‘‘MATH’’
3Ø PRINT ‘‘    IS’’
4Ø PRINT ‘‘   GREAT’’
5Ø END
```

8.
```
5 [clear screen]
1Ø PRINT ‘‘REAL ’’;
2Ø PRINT ‘‘MATH’’
25 PRINT ‘‘    ’’
3Ø PRINT ‘‘    IS’’
35 PRINT ‘‘    ’’
4Ø PRINT ‘‘   GREAT’’
5Ø END
```

9.
```
5 [clear screen]
1Ø PRINT ‘‘REAL ’’;
2Ø PRINT ‘‘MATH’’
25 PRINT ‘‘    ’’
3Ø PRINT ‘‘IS ’’;
4Ø PRINT ‘‘GREAT’’
5Ø END
```

10.
```
*
*
*
```

11.
```
**
*
```

12.
```
5 [clear screen]
1Ø PRINT ‘‘*’’;
2Ø PRINT ‘‘*’’
3Ø PRINT ‘‘ *’’
4Ø END
```

13.
```
5 [clear screen]
1Ø PRINT ‘‘*’’;
2Ø PRINT ‘‘*’’;
3Ø PRINT ‘‘*’’
4Ø END
```

14.
```
5 [clear screen]
1Ø PRINT ‘‘* ’’;
2Ø PRINT ‘‘*’’;
3Ø PRINT ‘‘*’’
4Ø END
```

15.
```
5 [clear screen]
1Ø PRINT ‘‘*’’;
2Ø PRINT ‘‘* ’’;
3Ø PRINT ‘‘*’’
4Ø END
```

16.
```
5 [clear screen]
1Ø PRINT ‘‘* ’’;
2Ø PRINT ‘‘* ’’;
3Ø PRINT ‘‘*’’
4Ø END
```

LESSON 3

```
HELLO
TEACHER
MATH
IS
GREAT
```

LESSON 3 (Continued)

1.
```
5 [clear screen]
1Ø PRINT ‘‘  HELLO’’
2Ø PRINT ‘‘TEACHER’’
3Ø PRINT ‘‘  MATH’’
4Ø PRINT ‘‘   IS’’
5Ø PRINT ‘‘ GREAT’’
6Ø END
```

2.
```
  HELLO
TEACHER
NEBRASKA
   IS
 GREAT
```

3.
```
5 [clear screen]
1Ø PRINT ‘‘  HELLO’’;
2Ø PRINT ‘‘TEACHER’’
3Ø PRINT ‘‘NEBRASKA’’
4Ø PRINT ‘‘   IS’’
5Ø PRINT ‘‘ GREAT’’
6Ø END
```

4.
```
5 [clear screen]
1Ø PRINT ‘‘  HELLO ’’;
2Ø PRINT ‘‘TEACHER’’
3Ø PRINT ‘‘NEBRASKA’’
4Ø PRINT ‘‘   IS’’
5Ø PRINT ‘‘ GREAT’’
6Ø END

  HELLO TEACHER
NEBRASKA
   IS
 GREAT
```

5.
```
5 [clear screen]
1Ø PRINT ‘‘  HELLO ’’;
2Ø PRINT ‘‘TEACHER’’
25 PRINT ‘‘   ’’
3Ø PRINT ‘‘NEBRASKA’’
35 PRINT ‘‘   ’’
4Ø PRINT ‘‘   IS’’
45 PRINT ‘‘   ’’
5Ø PRINT ‘‘ GREAT’’
6Ø END
```

6.
```
*
**
```

7.
```
5 [clear screen]
1Ø PRINT ‘‘*’’
2Ø PRINT ‘‘* *’’
3Ø PRINT ‘‘* * *’’
4Ø END
```

8.
```
5 [clear screen]
1Ø PRINT ‘‘    *’’
2Ø PRINT ‘‘  * *’’
3Ø PRINT ‘‘* * *’’
4Ø END
```

9.
```
5 [clear screen]
1Ø PRINT ‘‘    *’’
2Ø PRINT ‘‘  * * *’’
3Ø PRINT ‘‘* * * * *’’
4Ø PRINT ‘‘    *’’
5Ø PRINT ‘‘    *’’
6Ø END
```

10. Student programs will vary, but they should be based on the programs above.

LESSON 4

```
I LOVE MATH
I LOVE MATH
I LOVE MATH
I LOVE MATH
I LOVE MATH
I LOVE MATH
I LOVE MATH
```

1.
```
5 [clear screen]
1Ø LET C = 1
2Ø PRINT ‘‘I LOVE MATH’’
3Ø IF C = 5 THEN 7Ø
4Ø LET C = C + 1
5Ø GOTO 2Ø
7Ø END
```

2.
```
3Ø IF C = 12 THEN 7Ø
```

LESSON 4 (Continued)

```
 3.  2Ø PRINT ‘‘I LOVE MATH  ’’;

 4.  3Ø IF C = 1ØØ THEN 7Ø

 5.  3Ø IF C = 1ØØØ THEN 7Ø

 6.  2Ø PRINT ‘‘I LOVE MATH’’
     3Ø IF C = 15 THEN 7Ø

 7.  2Ø PRINT ‘‘           I LOVE MATH’’

 8.  25 PRINT ‘‘     ’’

 9.  1
     2
     3
     4
     5
     6
     7
     8
     9
     1Ø

10.  3Ø IF C = 15 THEN 7Ø

11.  2Ø PRINT C;

12.  1  2  3  .  .  .  13  14  15

13.  3Ø IF C = 1ØØØ THEN 7Ø
```

LESSON 5

```
                  1
                  2
                  3
                  4

 1.  3Ø IF C = 7 THEN 6Ø

 2.  3Ø IF C = 5 THEN 6Ø

 3.  25 PRINT

 4.  2Ø PRINT C;
     25

 5.  3Ø IF C = 7 THEN 6Ø

 6.  2Ø PRINT C; ‘‘  ’’;

 7.  3Ø IF C = 15 THEN 6Ø

 8.  3Ø IF C = 3Ø THEN 6Ø

 9.  2Ø PRINT C
```

LESSON 6

```
                  Ø
                  1
                  2
                  3
                  4
                  5
                  6
                  7

 1.  1Ø LET C = 5

 2.  1Ø LET C = 2

 3.  1Ø LET C = 6

 4.  1Ø LET C = 3

 5.  3
     5
     7

 6.  1Ø LET C = 1
     3Ø IF C = 9 THEN 6Ø

 7.  1Ø LET C = 2
     3Ø IF C = 14 THEN 6Ø

 8.  1Ø LET C = 3
     4Ø LET C = C + 3

 9.  4Ø LET C = C + 5
```

LESSON 6 (Continued)

```
10.  4Ø LET C = C + 7

11.  3Ø IF C = 259 THEN 6Ø

12.  3Ø IF C = 756 THEN 6Ø
```

LESSON 7

```
                    name
                    name
                    name
                    name

 1.  3Ø IF C = 8 THEN 6Ø

 2.  3Ø IF C = 13 THEN 6Ø

 3.  2Ø PRINT ‘‘YOUR NAME’’;

 4.  3Ø IF C = 1Ø3 THEN 6Ø

 5.  2Ø PRINT ‘‘YOUR  NAME’’

 6.  25 PRINT ‘‘      ’’

 7.  4

     5

     6
     .
     .
     .
     101

     102

     103
```

LESSON 8

```
                      1
                      2
                      3
                      4
                      5
                      6
                      7

 1.  1Ø LET C = 2

 2.  1Ø LET C = 4

 3.  3Ø IF C = 9 THEN 6Ø

 4.  1Ø LET C = 6
     3Ø IF C = 12 THEN 6Ø

 5.  1Ø LET C = 1Ø

 6.  2Ø PRINT C;

 7.  1Ø LET C = 2
     2Ø PRINT C; ‘‘   ’’;
     4Ø LET C = C + 2

 8.  1Ø LET C = 3
     4Ø LET C = C + 3

 9.  1Ø LET C = 4
     4Ø LET C = C + 4

10.  1Ø LET C = 21
     3Ø IF C = 84 THEN 6Ø
     4Ø LET C = C + 21
```

LESSON 9

```
                      1
                      2
                      3
                      4
                      5
                      6

 1.  1Ø LET C = 2
     2Ø PRINT C; ‘‘   ’’;
     3Ø IF C = 8 THEN 6Ø
     4Ø LET C = C + 2
```

LESSON 9 (Continued)

2.
```
1Ø LET C = 3
3Ø IF C = 11 THEN 6Ø
```

3.
```
1Ø LET C = 5
3Ø IF C = 17 THEN 6Ø
4Ø LET C = C + 3
```

4.
```
1Ø LET C = 11
3Ø IF C = 35 THEN 6Ø
4Ø LET C = C + 6
```

5.
```
1Ø LET C = 1
3Ø IF C = 8 THEN 6Ø
4Ø LET C = C + 1
```

6.
```
1Ø LET C = 8
3Ø IF C = 1 THEN 6Ø
4Ø LET C = C - 1
```

7.
```
1Ø LET C = 3
3Ø IF C = 8 THEN 6Ø
4Ø LET C = C + 1
```

8.
```
1Ø LET C = 8
3Ø IF C = 3 THEN 6Ø
4Ø LET C = C - 1
```

9.
```
1Ø LET C = 2
3Ø IF C = 1Ø THEN 6Ø
4Ø LET C = C + 2
```

10.
```
1Ø LET C = 12
3Ø IF C = 2 THEN 6Ø
4Ø LET C = C - 2
```

11.
```
1Ø LET C = 11
3Ø IF C = 3 THEN 6Ø
```

12.
```
1Ø LET C = 35
3Ø IF C = 11 THEN 6Ø
4Ø LET C = C - 6
```

13.
```
1Ø LET C = 1
2Ø PRINT ‘‘YOUR NAME’’
3Ø IF C = 7 THEN 6Ø
4Ø LET C = C + 1
```

14.
```
25 PRINT ‘‘      ’’
```

15.
```
2Ø PRINT C; ‘‘ STEVE’’
3Ø IF C = 3 THEN 6Ø
```

16.
```
2Ø PRINT C; ‘‘. STEVE’’
```

LESSON 10

```
                1
                2
                3
                4
                5
```

1.
```
2Ø PRINT C; ‘‘  ’’;
4Ø IF C < 9 THEN 2Ø
```

2.
```
1Ø LET C = 4
4Ø IF C < 8 THEN 2Ø
```

3.
```
1Ø LET C = 2
3Ø LET C = C + 2
4Ø IF C < 9 THEN 2Ø
```

4.
```
1Ø LET C = 3
4Ø IF C < 1Ø THEN 2Ø
```

5.
```
1Ø LET C = 6
3Ø LET C = C + 5
4Ø IF C < 47 THEN 2Ø
```

6.
```
1Ø LET C = 7
3Ø LET C = C + 8
4Ø IF C < 8Ø THEN 2Ø
```

```
1
2
3
4
5
6
```

(Don’t forget NEW)

LESSON 10 (Continued)

7.
```
15 LET C = 2
25 PRINT C; ‘‘  ’’;
35 IF C > 12 THEN 7Ø
45 LET C = C + 2
```

8.
```
15 LET C = 3
35 IF C > 11 THEN 7Ø
```

9.
```
15 LET C = 6
35 IF C > 46 THEN 7Ø
45 LET C = C + 5
```

10.
```
15 LET C = 7
35 IF C > 79 THEN 7Ø
45 LET C = C + 8
```

LESSON 11

Note: All values given as smallest and largest in these answers are the smallest and largest *possible* values, not necessarily the smallest and largest values printed.

Note: For Radio Shack computers, all RND(1) statements should be changed to RND(Ø).

1. smallest 1
largest 9

2.
```
2Ø LET X = INT(9 * RND(1))
```
smallest 0
largest 8

3.
```
2Ø LET X = INT(8 * RND(1))
```
smallest 0
largest 7

4. smallest 1
largest 10

5.
```
2Ø LET X = INT(9 * RND(1)) + 1
```
smallest 1
largest 9

6.
```
2Ø LET X = INT(8 * RND(1)) + 1
```
smallest 1
largest 8

7.
```
2Ø LET X = INT(6 * RND(1)) + 1
```
smallest 0
largest 5

8.
```
2Ø LET X = INT(6 * RND(1)) + 1
```
smallest 1
largest 6

9.
```
2Ø LET X = INT(3 * RND(1)) + 1
5Ø IF C < 21 THEN 2Ø
```
smallest 1
largest 3

10.
```
2Ø LET X = INT(3 * RND(1))
```
smallest 0
largest 2

LESSON 12

Note: For Radio Shack computers, RND(1) statements should be changed to RND(Ø).

1.
```
11Ø PRINT ‘‘VERY NICE WORK’’
```

2.
```
8Ø PRINT ‘‘WRONG, TRY AGAIN
PLEASE’’
```

3.
```
1Ø LET X = 4
```

4.
```
1Ø LET X = 7
```

5.
```
1Ø LET X = 3
```

6.
```
2Ø LET Y = INT(5 * RND(1))
```

7.
```
2Ø LET Y = INT(7 * RND(1))
```

8.
```
2Ø LET Y = INT(6 * RND(1)) + 1
```

LESSON 12 (Continued)

9. `13Ø IF C = 3 THEN 14Ø`

10. `13Ø IF C = 5 THEN 14Ø`

11. `13Ø IF C = 1Ø THEN 14Ø`

12. The program runs as it did before, but it now asks you for your name and then uses your name each time it asks you `WHAT IS THE PRODUCT?`

13.
    ```
    5Ø LET S = X + Y
    11Ø PRINT A$; ‘‘, VERY NICE
    WORK’’
    ```

14.
    ```
    8Ø PRINT ‘‘WRONG, ’’;A$;
    ‘‘, TRY AGAIN PLEASE’’
    ```

15. `13Ø IF C = 4 THEN 14Ø`

16. `1Ø LET X = INT(5 * RND(1))`

17. `2Ø LET Y = INT(6 * RND(1)) + 1`

LESSON 13

Note: For Radio Shack computers, `RND(1)` statements should be changed to `RND(Ø)`. All values given as smallest and largest in these answers are the smallest and largest *possible* values, not necessarily the smallest and largest values printed.

1. smallest 0
   largest 1

2. `2Ø LET X = INT(9 * RND(1))`

3. `2Ø LET X = INT(9 * RND(1)) + 1`

4. `2Ø LET X = INT(9 * RND(1)) + 2`

5. `2Ø LET X = INT(9 * RND(1)) + 3`

6. `2Ø LET X = INT(6 * RND(1))`

7. `2Ø LET X = INT(6 * RND(1)) + 1`

8. `2Ø LET X = INT(6 * RND(1)) + 1Ø`

9. `2Ø LET X = INT(6 * RND(1)) + 12`

10. `2Ø LET X = INT(8 * RND(1)) + 1Ø`

LESSON 14

1.
    ```
    ******GOOD WORK
    ******
    GOOD WORK
    ```

2.
    ```
    77 PRINT ‘‘      ’’
    ```

3.
    ```
                ******
    GOOD WORK
    ```

4. Same as problem 3 with `******` at column 20.

5.
    ```
    ******
    GOOD WORK
    ```

6. `2Ø LET T = 9`

7. `5Ø IF X = 5 THEN 75`

8.
    ```
    2Ø LET T = 1
    5Ø IF X = 4 THEN 75
    ```

9. `5Ø IF X = 7 THEN 75`

10.
    ```
    *
    *
    *
    *
    *
    *
    *

    GOOD WORK
    ```

11.
    ```
    2Ø LET T = 5
    5Ø IF X = 6 THEN 75
    ```

12. `2Ø LET T = 9`

LESSON 14 (Continued)

13.
```
*
 *
  *
   *
    *
     *

GOOD WORK
```

14.
```
2Ø LET T = 9
```

15.
```
55
```

16.
```
2Ø LET T = 5
4Ø PRINT ‘‘**’’
55 LET T = T + 1
```

17.
```
2Ø LET T = 9
```

18.
```
4Ø PRINT ‘‘*’’
55
```

19.
```
55 LET T = T - 1
```

20.
```
4Ø PRINT ‘‘**’’
```

LESSON 15

1.
```
5 [clear screen]
1Ø LET X = 1
2Ø LET T = 1
3Ø PRINT TAB(T);
4Ø PRINT ‘‘AWESOME’’
5Ø IF X = 5 THEN 8Ø
6Ø LET X = X + 1
7Ø GOTO 4Ø
8Ø END
```

2.
```
2Ø LET T = 1Ø
```

3.
```
2Ø LET T = 2Ø
```

4.
```
2Ø LET T = 1
```

5.
```
4Ø PRINT ‘‘AWESOME  ’’;
```

6.
```
5Ø IF X = 4 THEN 8Ø
```

7.
```
4Ø PRINT ‘‘AWESOME’’
```

8.
```
65 LET T = T + 1
7Ø GOTO 3Ø
```

9.
```
65 LET T = T + 2
```

10.
```
4Ø PRINT ‘‘AWESOME      AWESOME’’
65 LET T = T + 3
```

11.
```
4Ø PRINT ‘‘AWESOME’’
65
```

12.
```
2Ø LET T = 15
65 LET T = T - 1
```

13.
```
65 LET T = T - 2
```

14.
```
2Ø LET T = 2Ø
```

15.
```
2Ø LET T = 18
65 LET T = T + 1
```

16.
```
25 PRINT TAB(T); ‘‘AWESOME’’
5Ø IF X = 3 THEN 8Ø
```

LESSON 16

The program prints six of the character that you enter, followed immediately by GOOD WORK.

1. The program runs as before but prints GOOD WORK on the line below the characters.

2.
```
96 PRINT ‘‘      ’’
```

3.
```
7Ø IF X = 12 THEN 95
```

4.
```
4Ø LET T = 9
7Ø IF X = 6 THEN 95
```

5.
```
65 PRINT ‘‘  ’’;
```

LESSON 16 (Continued)

6. When asked for a character, type $+.

7.
```
4Ø LET T = 1
6Ø PRINT A$
65
9Ø GOTO 5Ø
```

8.
```
4Ø LET T = 5
```

9.
```
4Ø LET T = 9
```

10.
```
4Ø LET T = 5
85 LET T = T + 1
```

11.
```
4Ø LET T = 15
85 LET T = T - 1
```

12.
```
4Ø LET T = 7
6Ø PRINT X; A$
85
1ØØ PRINT ''TERRIFIC''
```

13.
```
4Ø LET T = 12
85 LET T = T - 1
```

14.
```
4Ø LET T = 17
85 LET T = T - 2
```

LESSON 17

1. Type a + at the prompt.

2.
```
3Ø FOR N = 1 TO 2 STEP 1
```

3.
```
3Ø FOR N = 1 TO 1Ø STEP 1
```

4.
```
3Ø FOR N = 1 TO 15 STEP 1
```

5.
```
4Ø
```

6.
```
3Ø FOR N = 1 TO 6 STEP 1
4Ø PRINT A$
```

7. Screen clears after character is entered.

8.
```
3Ø FOR N = 1 TO 24 STEP 1
```

9.
```
24
```

10.
```
1
2
3
.
.
.
23
24
```

11.
```
3Ø FOR N = 1 TO 6 STEP 1
4Ø PRINT N; A$
```

12. Type .* when prompted.

13.
```
3
4
5
6
```

14.
```
3Ø FOR N = 7 TO 13 STEP 1
```

15. The very first character printed is in column 5.

16. All lines printed begin at column 5.

17. Removing line 28 has no effect now since line 32 has been added.

18. All lines printed begin at column 10.

19. The first line is printed at column 10. Each one thereafter is moved 1 column to the right of the previous one.

20. Enter $ at the prompt.

21. Enter FROG at the prompt.

22.
```
3Ø FOR N = 2 TO 5
35
55 PRINT ''TERRIFIC''
```

LESSON 18

1. `3Ø FOR N = 1 TO 5 STEP 1`

2.
```
7 LET T = 15
35 PRINT TAB(T);
```

3.
```
35
4Ø PRINT A;
```

4. This clears the screen after you input the number.

5. `12345`

6.
```
3Ø FOR N = 1 TO 9 STEP 1
37 PRINT ‘‘  ’’;
```

7. `7 LET T = 1`

8.
```
1
2
3
.
.
.
7
8
9
```

9. `7 LET T = 15`

10.
```
1
 2
  3
   4
    5
     6
      7
       8
        9
```

11. `3Ø FOR N = 3 TO 7 STEP 1`

12.
```
3
 5
  7
```

13.
```
1
 3
  5
   7
    9
```

14. `4Ø PRINT N;`

15. `3Ø FOR N = 2 TO 11 STEP 3`

16. `4Ø PRINT N; ‘‘  ’’;`

17. `3Ø FOR N = 9 TO 29 STEP 5`

18. `3Ø FOR N = 8 TO 26 STEP 3`

19. `3Ø FOR N = 5 TO 45 STEP 4`

20. `3Ø FOR N = 7 TO 79 STEP 8`

LESSON 19

```
(5 blank lines)
TIME
```

1. This time 10 blank lines are printed before TIME.

2. `1Ø FOR N = 1 TO 2Ø`

3. The added lines do not affect the output.

4. TIME is printed in column 15 after the 20 blank lines.

5. `7 LET T = 29`

6. `7 LET T = 35`

7. `7 LET T = 21`

8. `7 LET T = 14`

9. `7 LET T = 17`

LESSON 19 (Continued)

10. 3 seconds (approximately)

11.
```
1Ø FOR N = 1 TO 25Ø
```

12.
```
1Ø FOR N = 1 to 5ØØ
```

13-17. Answers will vary according to type of computer, version of BASIC, etc.

18. 1 second (approximately)

LESSON 20

1.
```
7Ø FOR J = 1 TO 9 STEP 2
```

2.
```
8Ø PRINT J
```

3.
```
7Ø FOR J = 1 TO 5 STEP 2
8Ø PRINT J ; A$
```

4. Enter ** when prompted.

5. Output lines are printed starting at column 10.

6.
```
25 LET T = 2Ø
4Ø FOR N = 1 TO 2Ø
```

7.
```
4Ø FOR N = 1 TO 8
7Ø FOR J = 3 TO 15 STEP 4
```

8.
```
3.
 7.
  11.
   15.
```

9.
```
7Ø FOR J = 2 TO 17 STEP 5
82 LET T = T + 2
```

10.
```
7Ø FOR J = 3 TO 15 STEP 2
82 LET T = T - 1
```

11.
```
   1Ø
  11
 12
13
```

12.
```
7Ø FOR J = 4 TO 1Ø STEP 2
8Ø PRINT J ; A$
82
```

13.
```
7Ø FOR J = 1Ø TO 6 STEP - 1
82 LET T = T - 1
```

LESSON 21

```
5
 6
  7
   8
    9
```

1.
```
5
  7
    9
      11
        13
```

2.
```
*
  *
    *
      *
        *
```

3.
```
1
  3
    5
      7
        9
```

4.
```
19
  39
    59
      79
        99
```

5.
```
1*
  3*
    5*
      7*
        9*
```

LESSON 21 (Continued)

6.

```
7Ø FOR J = 5 TO 11 STEP 2
8Ø PRINT TAB(T); J
9Ø T = T + 2
```

7.

```
8Ø PRINT TAB(T); J; A$
9Ø T = T + 3
```

8.

```
25 LET C = 1
7Ø FOR J = 5 TO 13 STEP 2
8Ø PRINT TAB(T) J; A$; C
9Ø T = T + 2
```

9.

```
25 LET C = 3
7Ø FOR J = 5 TO 11 STEP 2
8Ø PRINT TAB(T) J; C
9Ø T = T + 1
```

10.

```
25 LET C = 5
7Ø FOR J = 5 TO 9 STEP 2
85 LET C = C - 1
9Ø LET T = T - 1
```

11.

```
1   5   5
2   4   8
3   3   9
4   2   8
```

12.

```
1   5   5
2   5   1Ø
3   5   15
4   5   2Ø
```

13.

```
3Ø LET T = 3
9Ø LET T = T + 1
```

14.

```
25 LET C = 2
```

15.

```
25 LET C = 3
```

16.

```
25 LET C = 1
3Ø LET T = 6
9Ø LET T = T - 1
```

17.

```
25 LET C = 3
3Ø LET T = 8
85 LET C = C + 2
9Ø LET T = T - 2
```

18.

```
25 LET C = 1
3Ø LET T = 6
8Ø PRINT S
9Ø LET T = T - 1
```

19.

```
25 LET C = 4
3Ø LET T = 9
8Ø PRINT C; T
85 LET C = C + 1
```

20.

```
8Ø PRINT S
```

21.

```
25 LET C = 3
3Ø LET T = 5
9Ø LET T = T + 2
```